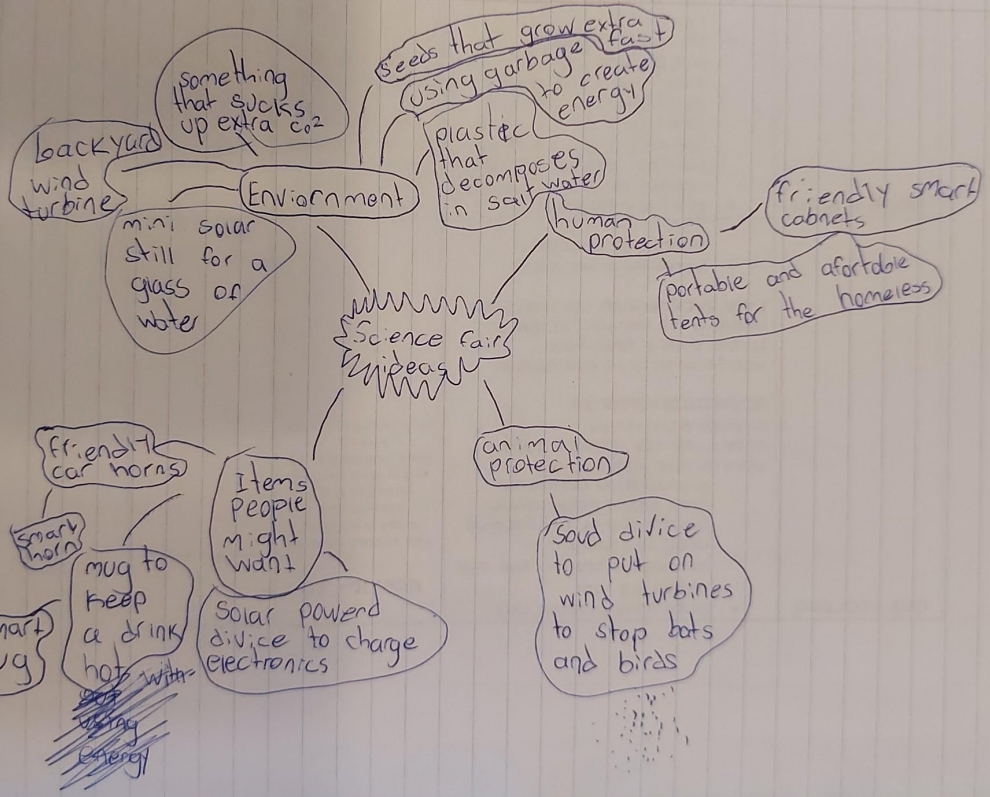
My science fair log-book

Logan Vickerson


Science fair ideas
Enviornment
something that sucks up extra CO_2
backyard wind turbine
mini solar still for a glass of water
seeds that grow extra fast
using garbage to create energy
plastic that decomposes in salt water
human protection
friendly smart cabnets
portable and afortable tents for the homeless
Items people might want
solar powerd divice to charge electronics
mug to keep a drink hot
smart mug
friendly car horns
smart horn
animal protection
Soud divice to put on wind turbines to stop bats and birds

#4

Email:
loganv19@educbe.ca

Science Fair Proposal:

Possible invention and/or innovation idea:

An insert for plastic ziplock type bags to go into the dishwasher.

#2

Possible essential question that I would like to explore regarding my project:

Can I design an insert for plastic ziplock type bags to go into the dishwasher to be cleaned and therefore reused.

Hypothesis:

If I design and create an insert for plastic ziplock type bags to go into the dishwasher then people might start to reuse these bags more because it will be easily and thoroughly cleaned in the dishwasher instead of by hand or be thrown out.

Brief project description:

I will design and then 3D print an insert for plastic ziploc bags to go in the dishwasher.

List some possible experts that can be contacted to support my research/learning:

1. My Aunt in Winnipeg
2. My parents
3. My baba (grandma)

Reasons for choosing this topic:

1. It is hard and time consuming to clean Ziplock type plastic bags by hand.
2. It will reduce the amount of Ziplock type bags to be thrown out which is better for the environment.
3. It would not be costly to manufacture.

Write a paragraph describing the invention and or innovation:

My innovation would best fit in the kitchen and household category because it involves using the dishwasher. Some benefits of my innovation are that it will be good for the environment, it will not be costly and it will save time and effort. I am focusing on any age bracket or gender for my project. If I were to market my innovation it would most likely be bought by adult men and women. I will design and create a flexible insert that will easily go inside a ziplock type bag and also easily fit in the bottom rack of a standard dishwasher using the pegs for support and stability. I will try to do a Voronoi 3D print design so that the water can go through the insert and thoroughly wash the bag.

I am interested in entering CYSF

Logan Vickerson

Jan 4

Things to do
- back ground research
- questionaire
- design → test → review with consumer / user
- observations
- start trifold

Test
- how well it cleans
- is the design good enough

Approximate price of design (If 3D printed)

Main peice: 72g

Stand: 21 g

filament roll: 1000 g

filament price

0.03
1000 | 30.00
-0
30
-0
300
-300
0

72
+21
93g

93.00
x 0.03
2.7900
+ 00000
+ 000000
2.7900

2.79
x 2.00
5.5800

6.00

TIMELINE 2020 - 2021

FOCUS	ACTION	DATE	DONE/NOT DONE
Introduction	• Review information during class time • Ask clarifying questions We've completed this task already/together	October 12 - 16	DONE ✔
Brainstorm	• Start a log book! STUDENTS WERE ASKED TO HAVE THIS READY IN OCTOBER. • Review various resources (books, magazines and websites) to get ideas for your science fair project. • Write your initial ideas in your log book. Choose a topic that interests you!	Nov. 2/20 (confirmed log book) Nov.02/20 (write all ideas down in log book - possibly 5 - 10)	done done done
Write a proposal	Written proposal is due today!! Your proposal must be approved by your science teacher and signed by a parent or guardian! *Title may be chosen later I WILL REVIEW THE PROPOSALS ASAP AND THEN LET EACH STUDENT KNOW IF IT HAS BEEN APPROVED. SUGGESTIONS AS TO HOW TO ALTER/IMPROVE THE OVERALL IDEA WILL ALSO BE ADDED.	Nov. 6/2020	done
Complete Project Paragraph	- written summary of invention/innovation with clear understanding of details and future uses. (guidelines shared with the proposal.)	Nov. 06/20	done

Get started	• Once your teacher has approved your procedure/plan -> you will need to submit a paragraph or 2 regarding your initial background information research. PARAGRAPHS NEED TO BE SUBMITTED VIA GOOGLE DOCS - SHARED WITH ME AT: mbturner@educbe.ca Add your work to the shared folder called: (add your name/class number) SCIENCE FAIR BACKGROUND INFORMATION - Attempt some trials regarding invention	Nov. 16- 30 (You should have at least the first, second and possibly third entry into the log book. Remember to include pictures/diagrams)	done
Make a Plan	• Create a plan of first, second, next, etc. that will help you focus throughout the stages of your work. This should be documented in your log book with dates, diagrams and details. • experts need to be identified • create a set of interview questions to ask the expert	Nov. 30/20 (first, second and possibly third entry into the log book.) Who are the experts you will be contacting? How will you contact them?	done
Background Research Due Log Book	- 1 - 2 paragraphs are due regarding the background research you completed prior to getting started - PARAGRAPHS NEED TO BE SUBMITTED VIA GOOGLE DOCS - SHARED WITH ME AT: mbturner@educbe.ca - Add your work to the shared folder called: (add your name/class number) SCIENCE FAIR BACKGROUND INFORMATION	Nov. 30 by now you should have about 5 - 7 entries in your logbook Don't forget to continue to add pictures and diagrams Include interview questions too	done
Contact Expert	- It is a mandatory component of this project that you contact/interview an expert	Dec. 03/20	

Hilroy

	that could extend advice/data to support your invention. - you should create a list of questions prior to making contact. These questions could reflect your background research findings.		done
Preparing for presentation	- Create an appealing and **informative display** for your project -> school supported (when possible) - working copy of log book due at school - consider using POWERPOINT AND/OR PREZI TO COMPLETE THIS STAGE	Week of January 11 - 22 2021	done
Presentation	- practice presenting your data - practice answering questions - present your work in front of the class - marked As of this date, if the teacher feels the project is not ready for LR Science Fair, teacher can remove project from fair - it will still be shared in Celebration of Learning.	Week of January 25 Students who are entering into the CYSF component of the fair will be given priority spots for sharing their presentations during class time A presentation order list will be posted within the classroom to ensure that each student is aware of their day. Presentation will be completed during class time.	done
Celebration of Learning	- Present your project at the school science fair/celebration of learning	Jan. 28/21	_____

Science Fair Judging	- Present your project at the school science fair - Non instructional day This information will be updated as we come closer to the date.	Jan. 29/21	_____

1. Do you use plastic ziploc bags for food storage?

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?

3. Do you clean your plastic ziploc bags?

4. How do you clean them?

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags

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Expert #1

1. Do you use plastic ziploc bags for food storage?
yes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?
Reuse them and throw them out

3. Do you clean your plastic ziploc bags?
yes

4. How do you clean them?
Wash them by hand

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)
7

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)
7

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags
reusing them if they have raw meat

Expert XX

1. Do you use plastic ziploc bags for food storage?

   yes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?

   reuse them and recycle them

3. Do you clean your plastic ziploc bags?

   yes and I hate it

4. How do you clean them?

   by hand in the sink with soap and water

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)

   6

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)

   7

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags

   riped get$ holes, seal wh are s out

1. Do you use plastic ziploc bags for food storage? expert x3
yes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?
reuse them or throw out

3. Do you clean your plastic ziploc bags?
yes

4. How do you clean them?
by hand in sink

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)
4-5

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)
8

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags
really dislike cleaning them

Expert #4

1. Do you use plastic ziploc bags for food storage?

no sometime

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?

reuse them

3. Do you clean your plastic ziploc bags?

yes

4. How do you clean them?

Hand wash them

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)

8

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)

9

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags

made of prastic

Hilroy

1. Do you use plastic ziploc bags for food storage? expert x 5
Sometimes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?
reuse them

3. Do you clean your plastic ziploc bags?
wash them

4. How do you clean them?
hand wash

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)
5

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)
5

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags
seal dtures out

1. Do you

2. If you
them

3. Do yo

4. How
in H

5. On
(10

6. On
(10

7. C
re

dirty

1. Do you use plastic ziploc bags for food storage? expect x 6

Yes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?

reuse them then recycle them sometimes I throw them out

3. Do you clean your plastic ziploc bags?

yes

4. How do you clean them?

in the kitchen sink

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)

8

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)

7

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags

a mont of water used to clean them dirty onesTake up space on the counter They start to wear down and break apart

1. Do you use plastic ziploc bags for food storage? expert #7
yes

2. If you use plastic ziploc bags for food storage, do you reuse them, recycle them, or throw them out?
Reuse 20%
Rycycle 30%

3. Do you clean your plastic ziploc bags?
sometimes

4. How do you clean them?
turn them inside out and let them dry

5. On a scale of 1-10 how much water do you use when cleaning your plastic ziploc bags? (10 being a lot of water, and 1 being not a lot of water)
5

6. On a scale of 1-10 how time consuming is it to clean your plastic ziploc bags by hand? (10 being really time consuming and 1 being not very time consuming)
8

7. Can you think of issues you have with your plastic ziploc bags that may prevent you from reusing your ziploc bags
raw meat in it

(2)

expert interview
somary

- if they use plastic bags: majoraty of them said yes
- if they reuse them: majeraty said they would reuse them, then said they throw them out, then recycle
- if they wash them: all of them said yes
- how do they clean them:
  all of them said they hand wash the bags

How much water do they use:
a range of 5-8

How much time does it take
a range of 5-4

any other problems:
Whers, ~~[illegible]~~
down, dont feel safe reusing if they held raw
mea, when drying they take up alot of space

~~Essay~~ research

Voronoi

Voronoi patterns can be found a lot in nature. (nature's cell structures, honeycomb and animal fur patterns)
These patterns are good for solving geometric problems like for example packing

A lot of architects use this mathematical design

This design is named after Georgy Voronoi

Ziploc bags

They are not reusable for a long time. We are constantly throwing plastic ziploc bags which is overflowing landfills and pollutes the environment

You can reuse them as long as you properly wash them by hand washing them in the sink

A ziploc representative says that if you store raw meat, eggs, raw fish, and potentially allergy causing items

To wash them turn them inside out and use warm soapy water so it can clean all the dirty spots

Make sure you don't make your water to hot because the BPA can leak into your food

Plastic bags take over 400 years to biodegrade

BPA (Bisphenol A)

Some symptoms of BPA are

- Immunity problems
- neurological problems
- increased likelihood of Alzheimer's
- childhood asthma
- metabolic disease

Variables

Controlled variables: the variable that I kept the same throughout my project

- The type of bag I used
- The type of dishwasher detergent I used
- The amount of dishwasher detergent I used
- The dishwasher settings (cycle)

Manipulated variable: the variable that I changed during my project

- The design of my innovation
- The way I put the bag in the dishwasher
- The items I put in the bag
- How many other dishes there were in the dishwasher

Responding variable: the variable that responded to the changes that I made

- How clean the bag was after testing

- type 2 diabetes
- cardiovascular disease

PETG filament (polyethylene terephthalate glycol-modified)

This type of plastic is water resistant and is a very strong type of 3D print material

PETG is a chemical resistant filament

The added glycol makes it so the material does not crystalize and become breakable

It is quite impact resistant

It can be sterilized

PETG has a higher temperature resistance than some other materials

It has a lower chance of warping or shrinking

This filament can easily get scratched

The material properties can be weakened by UV light

Considered to be food safe

PLA filament (Polylactic Acid)

This filament comes from renewable resources more specifically corn starch or sugar cane.

It is biodegradable and will break down in about 3-6 months making it environmentally friendly.

PLA is also used for things like medical implants, food packaging, and disposable tableware

There will most likely won't be any clogging or warping and will flow through the nozzle smoothly

Another benefit of PLA is that it will give you high quality surface details

It doesn't give off an odor when it is extruded

Tends to melt at high temperatures

This filament has a rougher texture than some other filaments

PLA is quite brittle in nature making it break quite easily under stress

Toxicity tests show that PLA is more toxic than some other filaments

Considered to be food safe

Hypothesis

I hypothesize that

If I design and create an insert that allows food storage bags to be washed in the dishwasher then people might be more likely to reuse these bags because they will be easily and thoroughly cleaned.

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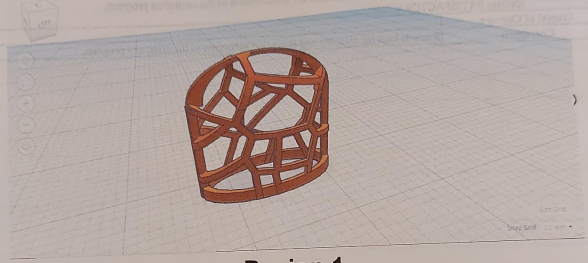
Purpose

I observed many people do not reuse food storage bags and many end up being thrown out once they have been used.

The purpose of my innovation is to allow for a way to easily wash ~~ziploc~~ bags in a dishwasher making it easier to reuse and therefor keeping them out of the landfill

pictures to add;
maybe a landfill

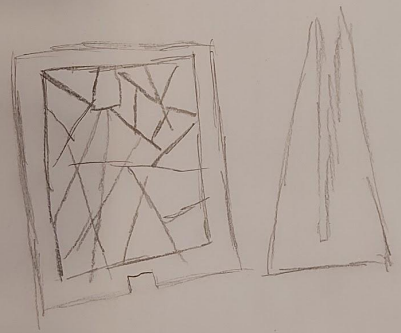


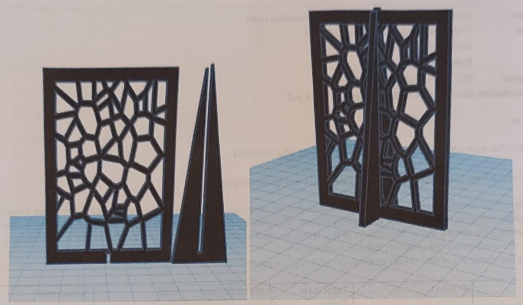
Design 1

My initial design is pictured here.

Although my initial design met all of the characteristics I was looking for, it was too difficult to print and was quite fragile once it was done. (This print took about 19 hours to print!)

Design #2





Design 2

My second design is pictured here

I created a second design (the design I ended up using) which consists of two parts. The main rectangular support holds the bag upright in the dishwasher. I designed holes in this upright support using a voronoi pattern which allows water to freely reach all inside surfaces of the bag. I chose the voronoi pattern because it is a mathematical pattern and is interesting to look at. The triangular supports main purpose is to prevent the bag from closing during the dishwashing cycle. This design is even

Sources

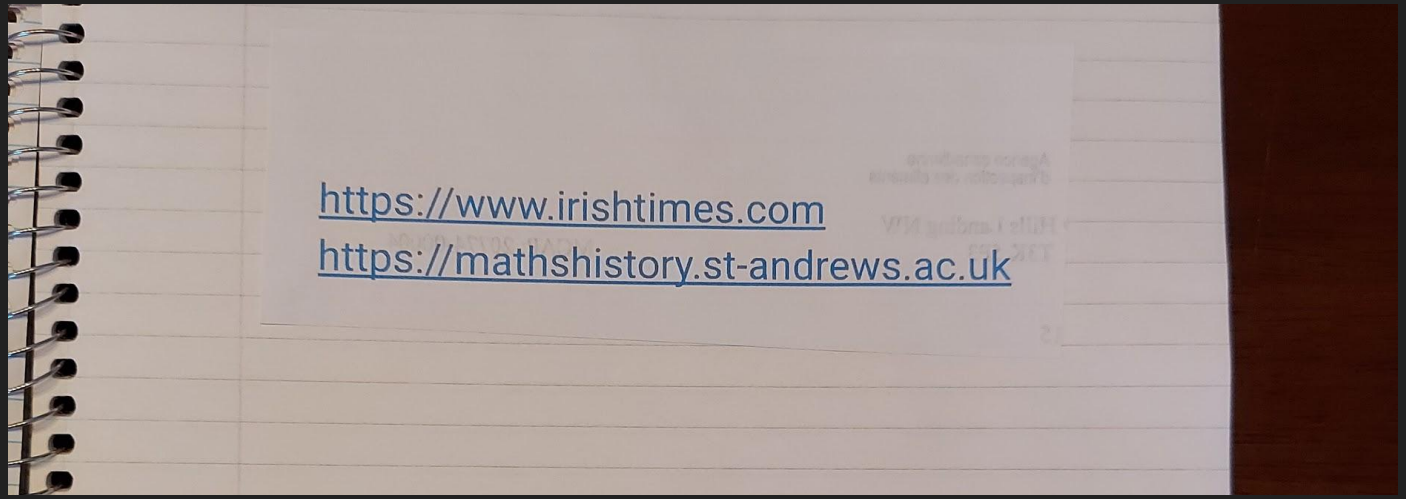
about plastic food storage bags
https://www.foodnetwork.com
https://www.tasteofhome.com
https://www.mashed.com
https://www.mentalfloss.com
https://www.theyummylife.com
https://www.biologicaldiversity.org
https://www.ziploc.com

Tinkercad: 3D designing software
https://www.tinkercad.com

Cura: 3D slicer software
https://ultimaker.com

About PLA
https://all3dp.com
https://www.weforum.org

About voronoi
https://en.wikipedia.org
https://www.researchgate.net
https://www.msichicago.org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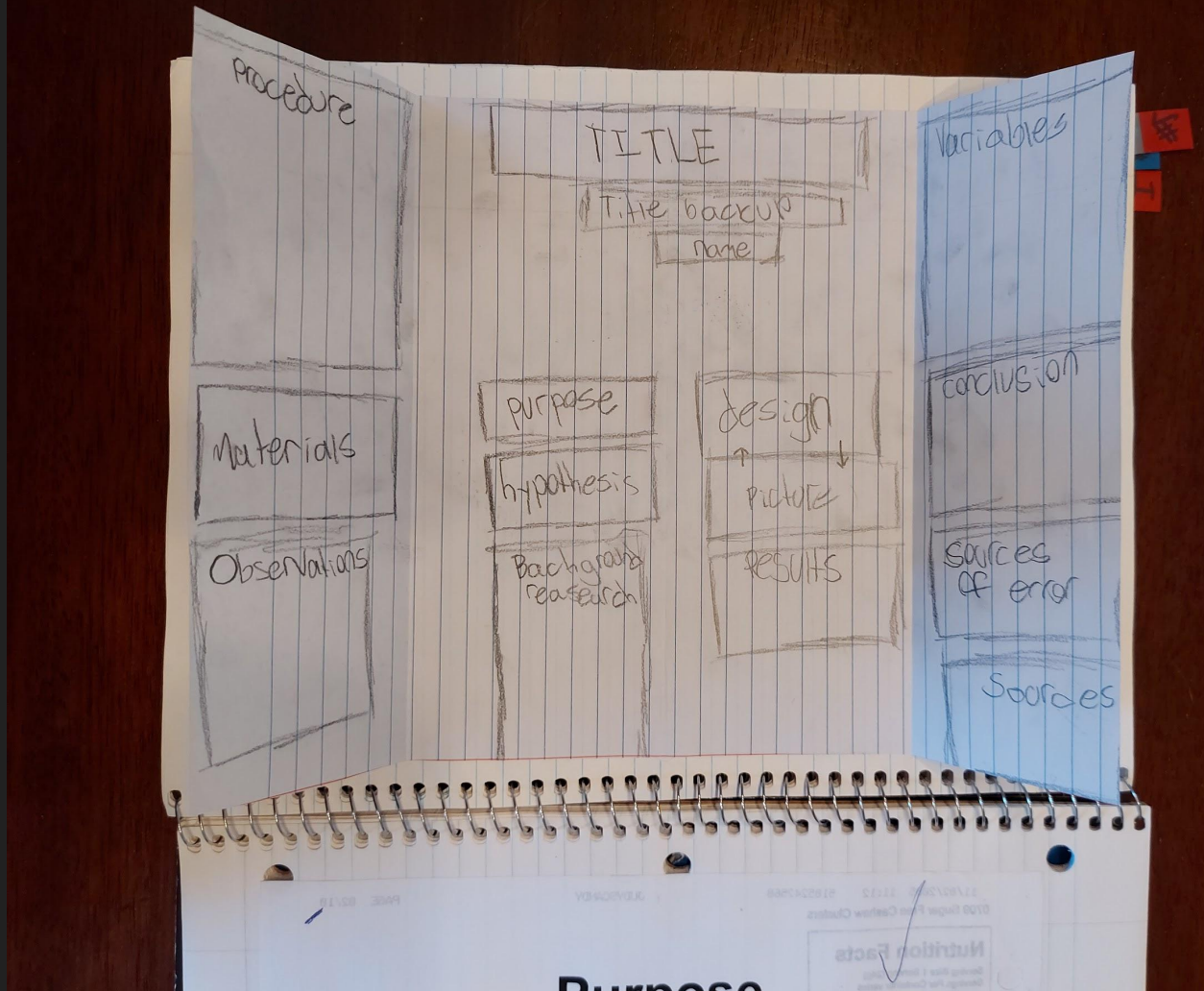
procedure
TITLE
Title backup
name
variables
materials
purpose
design
conclusion
hypothesis
picture
Observations
Background research
RESULTS
sources of error
Sources